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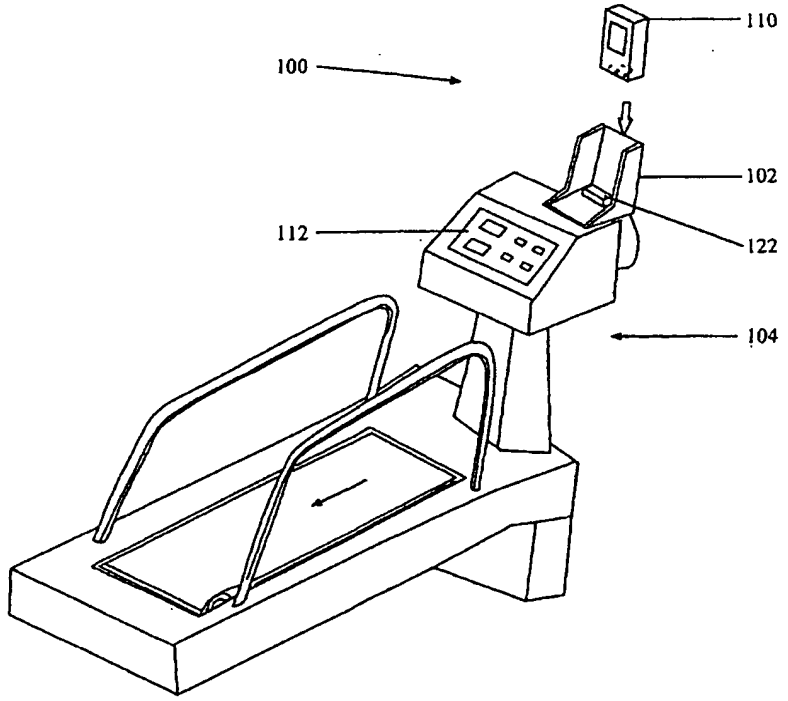
(54) Title: APPARATUS AND METHOD FOR INTERFACING PERSONAL ELECTRONICS TO EXERCISE EQUIPMENT

(57) Abstract

A Personal Electronic Device (PED) is inserted into a cradle on an exercise machine (402), and the user exercises (406). Exercise data is transferred from the machine to the PED (408). The PED is removed from the machine's cradle (409) and inserted, some time later, into a similar cradle on a computer (412), which analyzes the data (416). The process may be used in reverse, so that an exercise regimen developed at the computer is carried out on the exercise machine.



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APPARATUS AND METHOD FOR INTERFACING PERSONAL ELECTRONICS TO EXERCISE EQUIPMENT

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention relates to the field of personal electronics, and more specifically to the use of such personal electronics to collect and analyze data relating to a user's performance during periods of physical exercise.

II. Description of Related Technology

The need to rapidly access and exchange information in electronic form has become very significant in modern society. Conventional notebook and laptop computers, wireless telephones, facsimiles, and other personal electronic devices (PEDs) are often used to facilitate such access and to exchange information. One such personal electronic device is the so-called personal digital assistant, or PDA. A typical PDA functions as a personal organizer, facsimile, and/or personal computer with somewhat reduced capabilities. A PDA usually communicates via a dedicated data link or telephone line to establish connection with another computer, facsimile, or PDA. Unlike computers, PDAs are usually pen-based devices using a stylus rather than a keyboard for input. PDAs have the distinct benefit, however, of being easy to operate and highly mobile, even more so than laptop or notebook computers, thereby facilitating their use for a number of routine daily tasks. Ideally, a single PDA (or other PED) would be able to carry out a large number of different unrelated functions for the user without requiring the user to own and switch between separate devices depending on the function required at a given time. For example, the PDA could act as an appointment calendar/organizer, address book, telephone directory, Internet browser, and notepad, all in one device.

Another significant trend in recent times is that of personal exercise, both for health and recreation reasons. Many individuals have taken up the practice of exercising on a regular basis, many using stationary exercise equipment designed primarily to stimulate and condition the user's cardiovascular system. This equipment includes, for example, commonly known devices such as treadmills, rowing machines, exercise bicycles, and stair-steppers. Such equipment commonly includes an electronic control and display device which allows the user to input information (such as the desired level of difficulty, hill profile, etc.) via an input device such as an electronic keypad, and to obtain information regarding the user's progress or exercise routine via visual displays or audio output from the control and display device. Information obtained by the user typically includes performance data such as a confirmation of the difficulty level selected, the number of calories being burned per time period, the number of calories burned in total, the elapsed time since starting the exercise routine, the equivalent distance traveled, etc. Furthermore, the exercise equipment may be equipped with a cardiac monitor, which allows the user to monitor his/her heart rate during exercise. This latter function is useful for maintaining the user's heart rate within a desired range (commonly referred to as the "training" range).

Especially under the rigors of strenuous exercise, it is quite difficult for the user to interpret, analyze, and retain the data presented by the visual/audio displays. Furthermore, it is often desirable to obtain such data for a number of different exercise periods so that the user can analyze trends in their performance over time, or compare their performance to that of others. Ideally, the user would be able to perform this analysis in the comfort of their own home or office at any time desired. Existing exercise equipment does not afford the user these capabilities.

Based on the foregoing, an improved apparatus and method for obtaining, storing, and analyzing data relating to a user's exercise routine is needed. Such an improved apparatus and method would allow the user to

easily collect data for a number of different exercise periods (and/or types of exercise), and analyze this information at some later time. Ideally, this apparatus and method would also utilize existing electronic equipment owned by the user, so as to increase the flexibility of this equipment, and minimize cost to the user for possessing the aforementioned analysis capability.

SUMMARY OF THE INVENTION

The present invention satisfies the aforementioned needs by providing an improved apparatus and method for collecting, storing, and displaying information relating to a user's exercise program.

In a first aspect of the invention, an improved exercise device monitoring system is disclosed having a data analyzer, personal electronic device (PED), and first and second housing elements or cradles for receiving the PED. In one embodiment, the first housing element is operatively connected to a given piece of exercise equipment so as to be able to transfer data generated by the control and monitoring device (CMD) of the exercise equipment to the PED when the PED is connected thereto. A data acquisition program resident on the PED allows the PED to store data received from the CMD either upon command of the user, or automatically when the PED is "plugged into" the housing element. Upon the completion of the user's exercise routine, the PED is removed from the first housing element, and connected to the data analyzer located at a different location by being inserted into the second housing element. This allows for the transfer of the stored data from the PED to the data analyzer for further processing and analysis. The data analyzer may conveniently be a personal computer having an application program running thereon which is adapted to analyze, display, and store the data obtained from the PED.

In a second aspect of the invention, the data analyzer and PED are used to dynamically control the operation of the CMD when the PED is received within the first housing element. Expert software present on the data analyzer

generates an algorithm or data which is stored in the PED. Software resident within the PED acquires data from the CMD during user operation, and dynamically generates data and/or instructions which are transferred back to the CMD to facilitate or control its operation. For example, the expert software on the data analyzer may generate an optimal exercise profile for the user based on past exercise data; this profile is then fed to the CMD during the user's next exercise period in order optimize the user's training efficacy.

In a third aspect of the invention, an improved housing element or cradle for the personal electronic device (PED) of the previously described system is disclosed. In one embodiment, a first housing element is physically mounted to the exercise equipment, the latter providing information relating to the user's exercise routine and performance. The housing element includes recess for receiving the PED, and a serial data terminal or connector. The data terminal directly interfaces with both the CMD of the exercise equipment and the serial port of the PED, thereby allowing data transfer there between. The housing element and recess allows the PED to be received firmly therein, while automatically aligning the data terminals of the PED and the housing element, and allowing the user access to the display and control functions of the PED while using the exercise equipment.

In a fourth aspect of the invention, an improved method of obtaining and analyzing data from exercise equipment using a PED is disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1a is a perspective view of the exercise equipment and first housing element of one embodiment of the monitoring system of the present invention.

FIG. 1b is a perspective view of the second housing element and data analyzer of the monitoring system of FIG. 1a.

FIG. 2 is a functional block diagram of the embodiment of FIGS. 1a and 1b.

FIGS. 3a-3c are front, side, and top plan views, respectively, of one embodiment of a portable electronic device cradle according to the present invention.

FIG. 4 is flow diagram illustrating the method of obtaining data relating to the physical performance of a user according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference is now made to the drawings wherein like numerals refer to like parts throughout.

FIGS. 1a and 1b are perspective view of the various components of a first embodiment of the exercise equipment monitoring system of the invention. The system 100 comprises generally a first housing element or cradle 102 associated with a piece of exercise equipment 104 (FIG. 1a), and a second housing element or cradle 106 associated with a data analysis device 108 (FIG. 1b). A portable electronic device (PED) 110 is used to transfer data between the first and second housing elements 102, 106, as described in greater detail below. For the purposes of the present disclosure, the term "portable electronic device" (PED) shall include all electronic devices which are portable and capable of receiving and storing data, and running a data acquisition algorithm, including (but not limited to) personal digital assistants (PDAs), notebook computers, laptop computers, electronic organizers, and calculators. As used herein, the phrase "data acquisition algorithm" shall mean any computer program or algorithm, whether embodied in object code, firmware, or otherwise, which is capable of or facilitates the acquisition of data when used in conjunction with the aforementioned personal electronic device.

The exercise equipment 104 of the embodiment of FIG. 1a is a conventional treadmill, although it will be recognized that any number of different exercise devices such as stationary or moving bicycles, stair-steppers, and rowing machines may be used in conjunction with the present invention. The exercise

equipment 104 includes an electronic control and monitoring device (CMD) 112, which gathers and generates data relating to the operation of the exercise equipment 104 by the user (not shown). Such data may include the present difficulty level or resistance setting of the equipment 104, the equivalent distance "traveled" by the user, the estimated number of calories burned by the user, heart rate of the user, and the like. This data may be stored in the control and monitoring device 112 temporarily, and periodically or selectively transferred to the PED 110. Alternatively, the data may be streamed out of the CMD 112 to the PED 110 in real time for storage by the latter. The CMD 112 is equipped with a data interface terminal 114 (see FIG. 2) which facilitates the transfer of data between the CMD and the PED 110 via the data terminal 122 of the housing element 102. This housing element data terminal 122 is designed to mate with a corresponding terminal 116 in the PED 110 when the two devices are coupled together; e.g., when the PED is received within the housing element 102. Similarly, the second housing element 106 includes a data terminal 118 which also mates with the data terminal 116 of the PED when the latter is received within the second housing element 106. The foregoing data terminals 114, 116, 118 of the present embodiment are 9 pin RS-232 serial data interfaces, although it will be appreciated that other configurations and data transfer protocols may be used. The data terminal 114 of the CMD 112 is, in the illustrated embodiment, connected to the data terminal 122 of the first housing element 102 via a standard RS-232 compatible connection cable 115 so as to allow for movement of the housing element 102 with respect to the exercise device 104. It will be recognized, however, that the housing element 102 and associated terminal 122 may also be directly coupled to the circuitry within the CMD 112. A variety of other connection schemes may be used as well, all of which are well known in the information system arts.

FIG. 2 is a block diagram of the exercise equipment monitoring system of FIGS. 1a and 1b. As shown in FIG. 2, exercise equipment 104 of the present embodiment includes one or more sensors 200, a display unit 202, a data storage

device 204, a data processing and transfer control unit 206, an input device 208, and the aforementioned equipment data terminal 114. The sensors 200 collect data relating to the operation or performance of the exercise equipment in the form of physical signals such as, for example, a voltage level representative of number of rotations of the treadmill rollers per minute, and pass this data to the control unit. The data received from the sensors 200 is then analyzed and processed by the control unit 206 and displayed on one or more displays of the display unit 202. Such processing may include, for example, the calculation of the equivalent distance traveled by the user on the treadmill 104 based on the number of roller rotations per minute integrated over the duration of the exercise period.

The control unit 206 further contains a microcontroller (not shown), and software or embedded firmware which facilitates the formatting and transfer of the data to the PED 110 via the data terminals 114, 122. Optionally, the data may be stored in a storage device 204 such as an integrated circuit memory for later retrieval, or periodic transfer (as controlled by the control unit 206 or the PED 110) to the PED 110. The input device 208 provides for user input to the control unit 206 to control the operation of the treadmill and/or the transfer or storage of data. The construction and operation of the sensors 200, control unit 206, storage device 204, input device 208, and data terminal 114 are all well known in the electronic arts, and accordingly will not be described further herein.

Referring again to FIG. 2, the operation of the PED 110 is described. As shown in FIG. 2, the PED 110 is a portable device typically having a storage device 220 and an internal control unit 222 with processor (not shown). Exemplary PEDs 110 include the Apple Newton® PDA, and Palm III®/PalmPilot® organizers, although others may be used as previously described. The PED 110 includes a data terminal 116 which is compatible with the data terminals 122, 118 of the first and second housing elements 102, 106, respectively. The PED 110 further includes a data acquisition algorithm (DAA), which is used to direct and control the acquisition and storage of data within the PED 110, as well as the transfer of data from the PED to the data analyzer 108. The PED is received or docked within

either of the housing elements 102, 106, as described with reference to FIGS. 3a-3c below, with the data terminal 116 of the PED forming an electrical connection with the corresponding data terminal of the housing element. In the present embodiment, the DAA resident on the PED is automatically activated or initiated when the PED 110 is docked within the first housing element 102. Other types of data and program control, such as user initiated data transfer via the PED or the CMD control unit 206, may be used, however. Upon initiation, the DAA is made ready to receive and store data transferred to the PED 110 via the serial data connection. As the control unit 206 of the exercise equipment 104 generates and transmits data via the data terminals 114, 122, the PED stores this data within its internal storage device 220 as directed by the DAA. This stored data is considered "raw" at this juncture, since the data has not yet been analyzed by the data analyzer 108.

It should also be noted that while the PED 110 of the present invention primarily receives data from the CMD 112, it may also transmit data or commands generated by the DAA or other algorithms within the PED to the CMD. Such two-way communication between the PED and CMD is contemplated by the system disclosed herein. Furthermore, the rate and periodicity of data transfer between the CMD and the PED is configurable by the user, or alternatively automatically configured when the PED is received within the first housing element 102. For example, in one embodiment, the user generates a recommended exercise profile or other data using the expert or analysis software present on the data analyzer 108, as discussed in greater detail below, which is transferred to the PED 110 when the latter is docked within the second housing element 106. Software within the PED stores and retains this data until the user's next exercise period, at which time the PED 110 is inserted into the first housing element 102 by the user. The transfer of the data from the PED 110 to the CMD 112 via the data terminals 114, 122 is initiated either automatically upon insertion, manually by the user, or periodically by the PED 110, thereby allowing the CMD 112 to utilize the data during the user's exercise period. Such

data generated by the data analyzer 108 and transferred to the CMD 112 may include, inter alia, an optimized exercise profile based on the user's past performance, or an algorithm or program which dynamically generates optimized control data for the CMD 112 based on the input generated by the sensors 200 and/or control unit 206. Furthermore, it will be recognized that software resident on the PED may be used to receive and acquire data from the CMD 112, store the received data within the PED 110 for later analysis, and also dynamically generate data or instructions which are sent back to the CMD 112 and its control unit 206 via the data terminals 114, 122 while the PED 110 is received in the cradle 102 during use of the exercise equipment by the user.

When the user has completed his/her use of the exercise equipment 104, the PED 110 is removed from the first housing element 102, thereby disconnecting any electrical connection between the data terminals 114, 122, and transported to the location of the second housing element 106, typically the user's home or office. The PED 110 is then inserted into or mated with the second housing element 106 such that the data terminal 116 of the PED forms an electrical connection with the corresponding data terminal 118 of the housing element 106. As shown in FIG. 2, the second housing element 106 is electrically connected, via a serial data cable 252 similar to that used between the first housing element 102 and the exercise equipment 104, to a data analyzer 108 which receives data from the PED 110. The data analyzer 108 of the illustrated embodiment is advantageously a personal computer such as a desktop or laptop computer, although it will be appreciated that a myriad of different data computing and analyzing devices may be used with equal success. The data analyzer 108 of FIG. 2 includes, inter alia, an input device 254, a display device 256, a control unit 258 with associated microprocessor (not shown), and a storage device 260. The data analyzer 108 of the embodiment of FIG. 2 further includes an application program capable of receiving, storing, and analyzing the raw data stored within the storage device 220 of the PED. The application program is rendered in object code and stored within a non-volatile storage device within the analyzer 108, although other arrangements may be

used. The input and display devices 254, 256 allow interface between the user and the application program, thereby facilitating analysis of the raw data, and display of the results from the analysis. Such display may be in the form of tabular data, graphs, or any other display format, as is well known in the computer arts. These results may also be stored within the storage device 260 of the data analyzer for later retrieval.

Note that as an alternative embodiment to the second housing element 106 described above, the user may transfer data to the data analyzer by another data interface, such as that which may be provided by the manufacturer of the PED 110.

Referring now to FIGS. 3a-3c, a first embodiment of the first housing element 102 is described. FIGS. 3a, 3b, and 3c are front, side, and top plan views of the housing element 102, respectively. It will be recognized that the description provided herein is also applicable to the second housing element 106. As shown in the Figures, the housing element 102 comprises a substantially flat base member 300 and three substantially vertical wall members 302, 304, 306 attached to the base member 300 on three sides, thereby forming a recess 305 therein. The front region 308 of the housing element 102 is open to facilitate user access to the displays and controls of the PED 110 (not shown) received within the recess 305. The PED 110 is inserted into and slides along a channel 310 formed within the recess 305 of the housing element 102. The channel 310 is partially formed by two sliding tracks 314a, 314b which are formed on the interior of the side walls 304, 306. These sliding tracks are positioned so as to allow the PED to fit vertically within the channel 310, and to align the data terminal 116 on the bottom surface of the PED 110 with the data terminal 122 of the housing element 102 such that the two data terminals 116, 122 mate and form electrical contact when the PED is inserted into the channel 310. The sliding tracks 314a, 314b further act to firmly retain the PED 110 in its operational configuration within the housing element 102 during use.

The height of the wall members 302, 304, 306 of the housing element is such that the top portion of the PED 110 extends somewhat above the wall members when the PED is in its operational configuration in the housing element 102, thereby facilitating removal of the PED 110 from the housing element 102 by the user grasping the extending portion of the PED and pulling upwards. Similarly, when the PED is inserted into the channel 310, the user may simply push down gently on the top portion of the PED to engage and mate the data terminals 116, 122, which are vertically oriented. As shown in FIGS. 3b and 3c, the housing element 102 further includes an aperture 320 for the aforementioned data cable 252 so that the housing element 102 may be flush mounted to the exercise equipment 104 or other structure.

In an alternative embodiment, the first housing element 102 may be formed directly as part of or recessed within the exercise equipment housing (not shown), with the data terminal 122 integral with the exercise equipment. It will be apparent to one of ordinary skill in the art that a large variety of other different configurations of the housing element(s) 102, 106 of the present invention are also possible.

Referring now to FIG. 4, a method of obtaining and analyzing information regarding the performance of a user on exercise equipment is disclosed. In the first step 402 of the method 400, the user inserts the PED 110 into the first housing element 102 associated with the exercise equipment 104, thereby mating the data terminals 116, 122. As previously described, the PED is configured with a DAA to facilitate acquisition and storage of the raw data therein. In the next step 404, the PED is placed in condition to receive data (either automatically, when inserted in the housing element 102, or manually by the user). Next, in step 406, the user begins his/her exercise period on the exercise equipment 104. During this step 406, data is either stored internally within the CMD 112, or transferred periodically (or continuously) to the PED 110, depending on the configuration of the DAA and the CMD 112. Upon completion of the exercise period, the user determines in step 407 whether the data is to be stored in the CMD. If so, the user

proceeds to step 408 and transfers the data to the PED, after which the PED is removed from the housing element in step 409. If it is determined in step 407 that the data is not to be stored in the CMD, then the user proceeds directly to step 409. In step 410, the user transfers the PED to the location of the second housing element 106, and inserts the PED 110 into the second housing element in step 412.

In step 414, the user activates the data analyzer and resident data analysis application program, and initiates a download of the raw data stored within the PED 110 to the data analyzer 108. In step 416, the user analyzes the raw data using the aforementioned application program, thereby producing useful results, which may be stored per step 418.

Note that the preceding embodiment of the method 400 of the present invention may be modified such that the order of certain steps may be permuted, and/or certain steps added or deleted. For example, if the DAA is automatically initiated when the PED 112 is placed in the first housing element 102, the step 404 of placing the PED in condition to receive data is obviated. Similarly, the user may decide to collect and download raw data relating to a plurality of exercise periods at one time, and later analyze the data. These permutations and modifications are all considered to be within the scope of the invention.

While the above detailed description has shown, described, and pointed out the fundamental novel features of the invention as applied to various embodiments, it will be understood that various omissions, substitutions, and changes in the form and details of the devices or processes illustrated may be made by those skilled in the art without departing from the spirit or essential characteristics of the invention. The described embodiments are to be considered in all respects only illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than the foregoing description. All changes that come within the meaning and range of equivalence of the claims are to be embraced within their scope.

What is claimed is:

CLAIMS

1. A data interface for electronic exercise equipment, comprising:

A housing element, said housing element being operatively connected with said exercise equipment, said housing element further being adapted to receive a portable electronic device having at least a first data terminal;

a second data terminal, said second data terminal being disposed within at least a portion of said housing element so as to form a data path with said first data terminal when said portable electronic device is received within said housing element;

wherein said exercise equipment is capable of transferring data to said portable electronic device via said first and second data terminals when said portable electronic device is received within said housing element.

2. The data interface of Claim 1, wherein said portable electronic device is a personal digital assistant (PDA).

3. The data interface of Claim 2, wherein said first and second data terminals comprise a serial data interface.

4. The data interface of Claim 3, wherein said serial data interface is an RS-232 data interface.

5. The data interface of Claim 1, wherein said housing element is mounted on said exercise equipment such that said PDA is accessible by said user when said user is operating said exercise equipment and said PDA is received within said housing element.

6. The data interface of Claim 5, wherein said housing element is a cradle having a recess disposed therein, said recess being sized to receive at least a portion of said PDA.

7. An exercise device monitoring system, comprising:

at least one exercise device, said device being capable of generating data related to the operation of said exercise device by a user;

a portable electronic device having at least a first data terminal and being capable of receiving and storing said data; and

a first housing element operatively connected to said exercise device, said housing element having at least a second data terminal, said first housing element being adapted to receive said portable electronic device;

wherein said exercise device transfers said data to said portable electronic device via said first and second data terminals when said portable device is received within said housing element.

8. The exercise device monitoring system of Claim 7, wherein said portable electronic device is a personal digital assistant (PDA).

9. The exercise device monitoring system of Claim 7, wherein said first housing element is mounted on said exercise equipment such that said PDA is accessible by said user when said user is operating said exercise equipment and said PDA is received within said housing element.

10. The exercise device monitoring system of Claim 7, further comprising:

a data analyzer; and

a second housing element operatively coupled to said data analyzer and having a third data terminal, said second housing element being adapted to receive said portable electronic device;

wherein said portable electronic device transfers said data to said data analyzer via said third data terminal when said portable electronic device is received within said second housing element.

11. The exercise device monitoring system of Claim 10, wherein said data analyzer is a personal computer having a data analysis algorithm running thereon, said data analysis algorithm being capable of analyzing said data received from said portable electronic device.

12. The exercise device monitoring system of Claim 11, wherein said first and second data terminals comprise a serial data interface.

13. The exercise device monitoring system of Claim 12, wherein said serial data interface is an RS-232 data interface.

14. The data interface of Claim 10, wherein said second housing element is a cradle having a recess disposed therein, said recess being sized to receive at least a portion said personal electronic device.

15. A method of analyzing data regarding the operation of exercise equipment, comprising;

operating said exercise equipment, said exercise equipment being in a first location;

generating raw data related to the operation of said exercise equipment;

transferring said raw data from said exercise equipment to a portable electronic device;

transferring said portable electronic device to a second location;

transferring said raw data from said portable electronic device to a data analyzer;

analyzing said raw data using said data analyzer to produce analyzed data.

16. The method of Claim 15, wherein the act of generating raw data includes the act of generating data representative of the user's expended calories.

17. The method of Claim 15, wherein the act of transferring said raw data from said exercise equipment comprises the act of transmitting said raw data over a data interface using a serial data transfer protocol.

18. The method of Claim 17, wherein the act of transferring said raw data from said exercise equipment comprises:

connecting said personal electronic device to said exercise equipment such that data may be passed over said data interface;

automatically initiating a computer program resident on said personal electronic device; and

transferring said raw data in response to said initiation of said computer program.

19. The method of Claim 17, wherein the act of transferring said raw data from said portable electronic device to said data analyzer comprises the act of transmitting said raw data over a data interface using a serial data transfer protocol.

20. The method of Claim 18, wherein the act of analyzing said raw data comprises the act of processing said raw data using an application program resident within a storage device of said data analyzer.

21. A system for obtaining data relating to the operation of an exercise device, comprising;

means for generating data during operation of said exercise device, said means for generating being operatively connected to said exercise device;

means for acquiring said generated data;

first means for receiving said means for acquiring, said means for receiving being operatively connected to said means for generating and having means for transferring data to said means for acquiring;

wherein said means for acquiring is removably received by said means for receiving.

22. The system of Claim 21, further comprising:

means for analyzing data; and

second means for receiving said means for acquiring, said second means for receiving being operatively coupled to said means for analyzing and capable of transferring data from said means for acquiring to said means for analyzing;

wherein said second means for receiving is physically located such that said means for acquiring can not be received by said first means for receiving and said second means for receiving simultaneously.

23. The system of Claim 22, wherein said means for acquiring is a personal electronic device having at least one data terminal and a first computer program, said first computer program being adapted to acquire data via said at least one data terminal.

24. The system of Claim 23, wherein said means for analyzing is a personal computer having a second computer program running thereon, said second computer program being capable of analyzing data transferred from said personal electronic device.

25. A method of evaluating the physical performance of a user, comprising;

providing equipment being in a first location, said equipment being capable of generating data relating to the physical performance of a user;

coupling a portable electronic device to said equipment such that said data may be passed between said equipment and said portable device;

generating raw data related to the performance of said user;

transferring said raw data from said equipment to said portable electronic device, said raw data being stored therein;

transferring said portable electronic device to a second location;

transferring said raw data from said portable electronic device to a data analyzer;

analyzing said raw data using said data analyzer to produce analyzed data, and

evaluating the physical performance of said user based on said analyzed data.

26. The method of Claim 25, wherein the act of providing equipment comprises the act of providing exercise equipment adapted for use by said user.

27. The method of Claim 26, wherein the act of coupling said portable electronic device comprises the act of docking said device in a first housing element designed to receive said device, and having at least one data terminal disposed therein.

28. The method of Claim 27, wherein the act of transferring said raw data from said portable electronic device comprises the act of automatically initiating the operation of a computer program resident on said portable electronic device when said device is docked within said first housing element.

29. The method of Claim 27, wherein the act of transferring said raw data from said portable electronic device comprises the act of docking said device in a second housing element designed to receive said device, and having at least one data terminal disposed therein.

30. The method of Claim 28, wherein the act of evaluating the physical performance of said user comprises the act of displaying said analyzed data on a display device visible to said user.

31. An exercise device control system, comprising:

An exercise device;

a portable electronic device having at least a first data terminal and being capable of transmitting, receiving, and storing data; and

a first housing element operatively connected to said exercise device, said first housing element having at least a second data terminal, said first housing element also being adapted to receive said portable electronic device;

wherein said portable electronic device transfers data to said exercise device via said at least first and second data terminals when received within said second housing element so as to control at least a portion of said exercise device during the operation of said exercise device by a user.

32. The control system of Claim 1, further comprising:

a data analyzer, said data analyzer including a computer program capable of generating data; and

a second housing element operatively connected to said data analyzer, said second housing element having at least a third data terminal, said second housing element being adapted to receive said portable electronic device;

wherein said data analyzer transfers data to said portable electronic device transfers via said at least first and third data terminals when received within said second housing.

33. The control system of Claim 32, further comprising at least one control and monitoring device, said device being capable of generating data related to the operation of said exercise device by a user, and receiving data or information from said personal electronic device.

34. A method of controlling the operation of an exercise device, comprising:

providing a portable electronic device capable of transmitting, receiving, and storing data;

storing first data within said portable electronic device, said first data being useful in controlling said exercise device;

generating second data based on said first data;

connecting said portable electronic device to said exercise device such that said second data may be transferred there between;

transferring said second data from said personal electronic device to said exercise device; and

controlling the operation of said exercise device using said second data transferred from said portable electronic device.

35. The method of Claim 34, further comprising:

connecting said portable electronic device to a data analyzer; and

transferring said first data from said data analyzer to said portable electronic device.

36. The method of Claim 35, wherein the act of generating comprises the act of running a computer program resident on said portable electronic device which generates said second data.

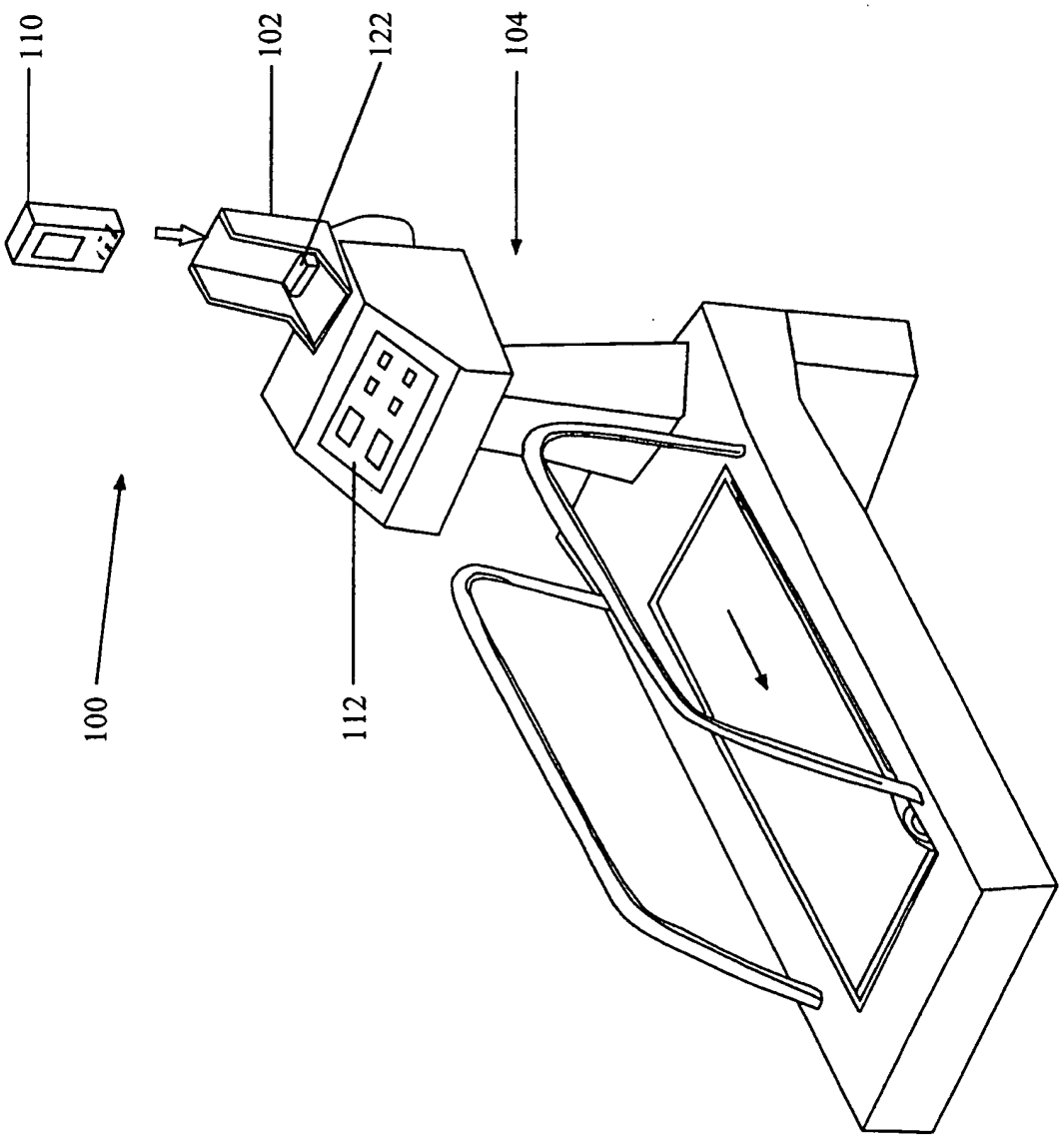

FIG. 1A

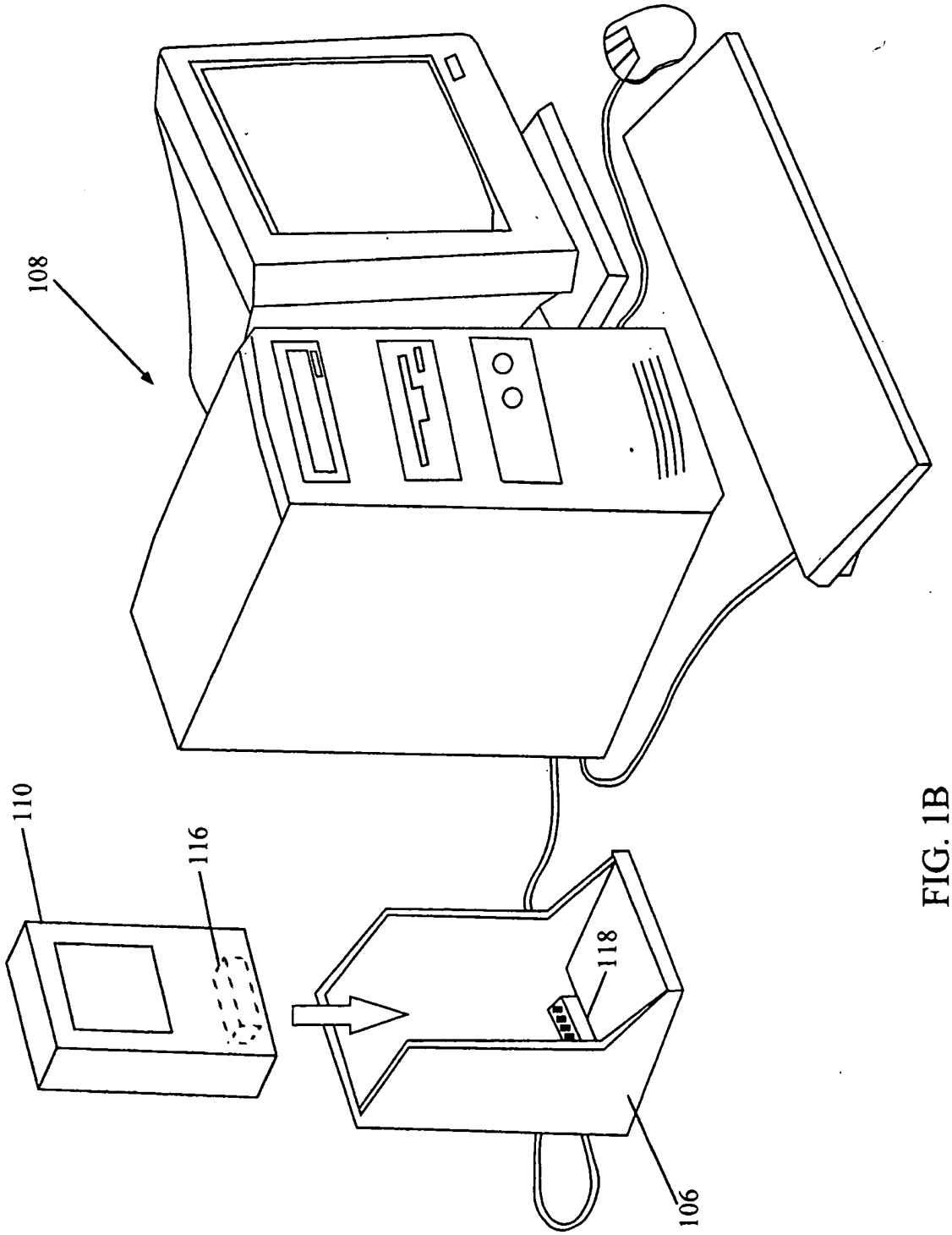

FIG. 1B

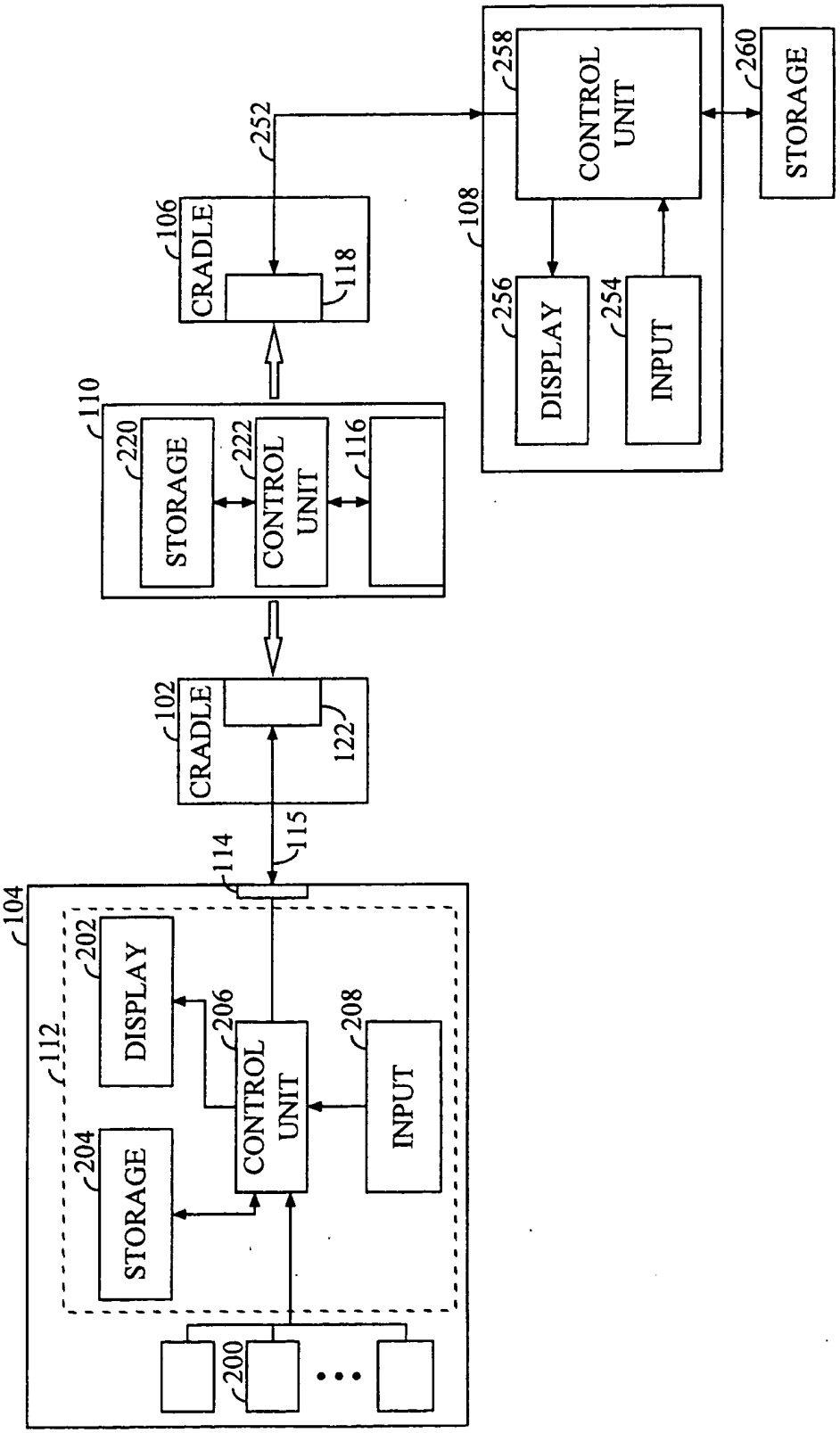
104
112
202
DISPLAY
204
STORAGE
206
CONTROL UNIT
208
INPUT
200
114
115
102
CRADLE
122
110
220
STORAGE
222
CONTROL UNIT
116
106
CRADLE
118
252
108
258
CONTROL UNIT
260
STORAGE
256
DISPLAY
254
INPUT

FIG. 2

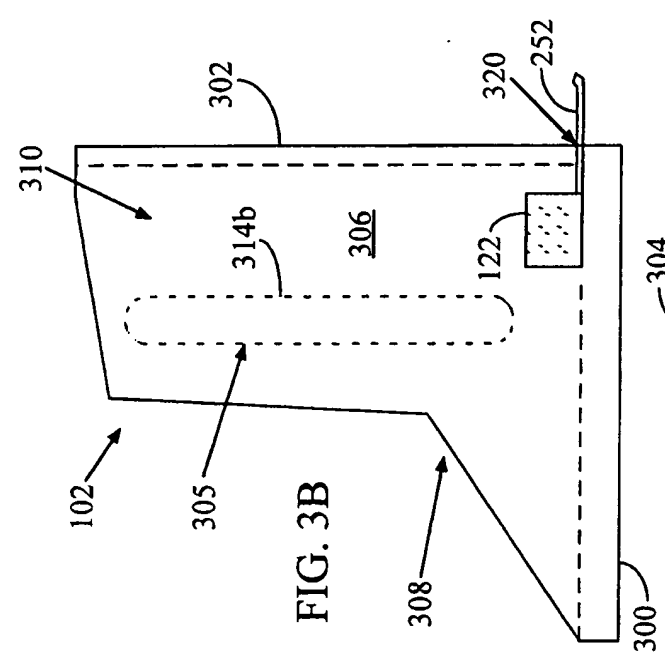

FIG. 3B

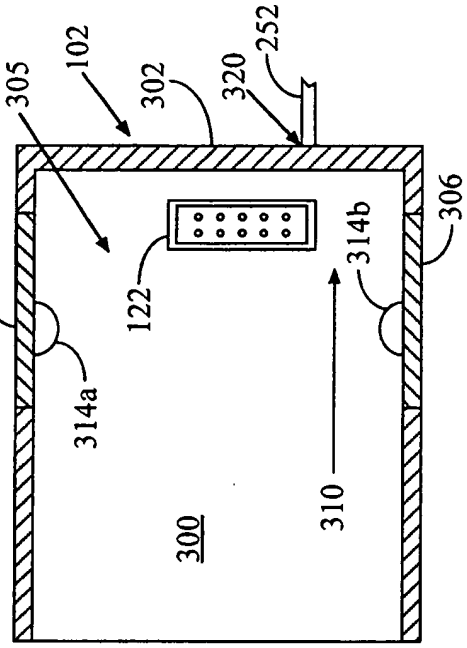

FIG. 3C

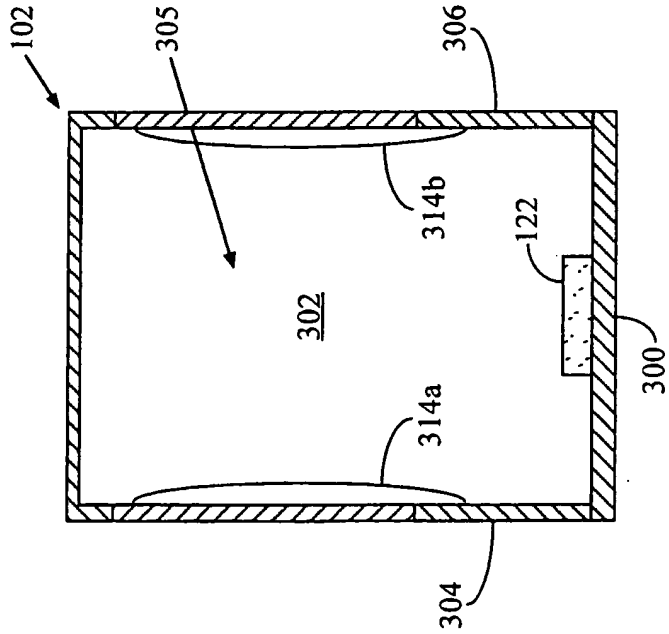

FIG. 3A

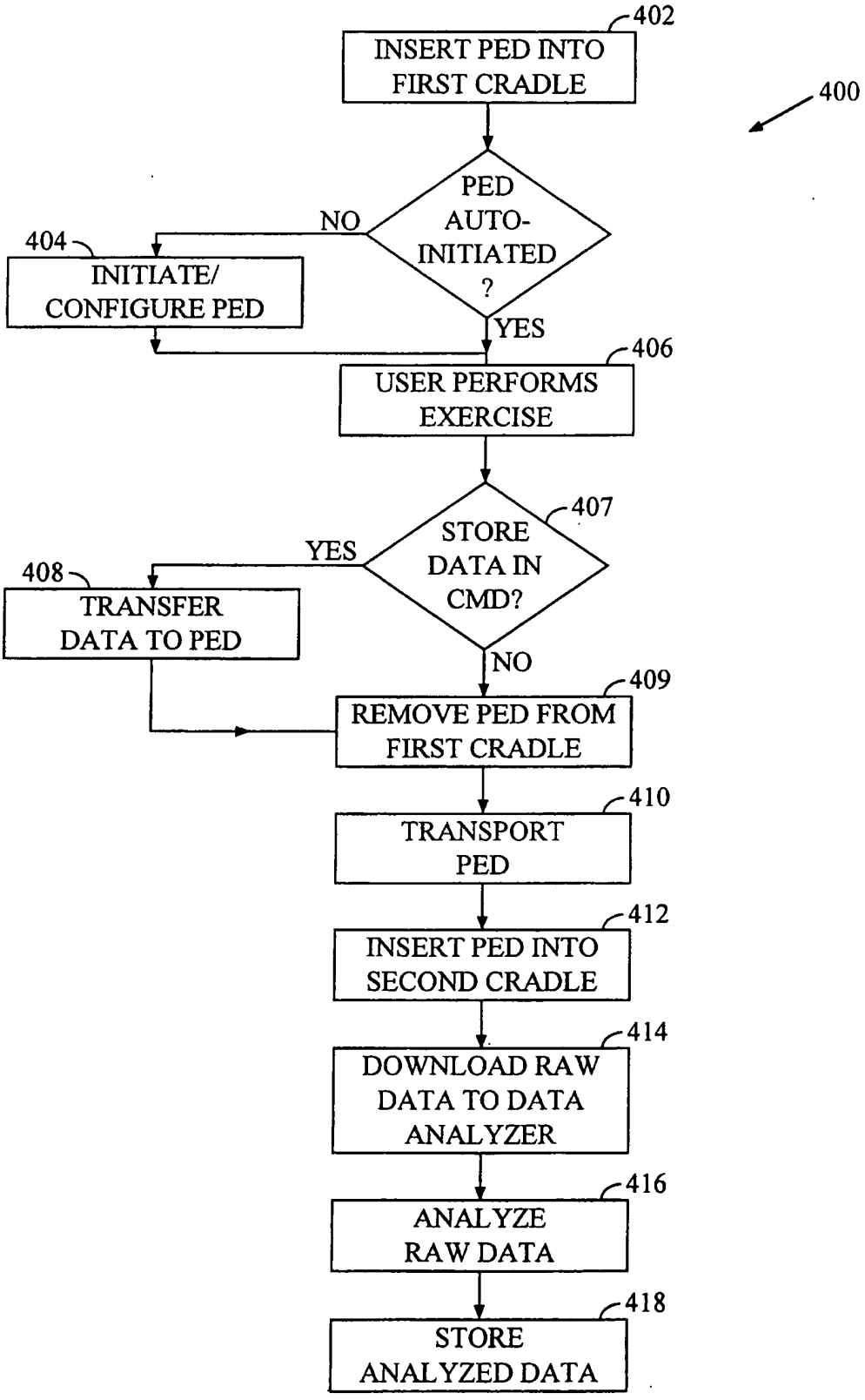
400
402
INSERT PED INTO FIRST CRADLE
PED AUTO-INITIATED ?
NO
YES
404
INITIATE/ CONFIGURE PED
406
USER PERFORMS EXERCISE
407
STORE DATA IN CMD?
YES
NO
408
TRANSFER DATA TO PED
409
REMOVE PED FROM FIRST CRADLE
410
TRANSPORT PED
412
INSERT PED INTO SECOND CRADLE
414
DOWNLOAD RAW DATA TO DATA ANALYZER
416
ANALYZE RAW DATA
418
STORE ANALYZED DATA

FIG. 4

INTERNATIONAL SEARCH REPORT

Int(ional Application No
PCT/US 00/11027

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A63B24/00 G06F1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A63B G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 38 07 038 C (BEUTEL PETER) 28 September 1989 (1989-09-28) column 1, line 65 -column 3, line 59 figures 1,2	1,15
Y		2-14, 16-27, 29-31
A		28,32-36

Y	US 5 890 997 A (ROTH ERIC S) 6 April 1999 (1999-04-06) column 1, line 45 -column 4, line 35 column 5, line 60 -column 8, line 39 column 29, line 47 -column 32, line 26 figures 1-6,21	2-14, 16-27, 29,30
A		1,15,28, 31-36

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 August 2000	22/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Baldan, M

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INTERNATIONAL SEARCH REPORT

Inte ional Application No
PCT/US 00/11027

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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A		1,7,15, 21,34-36

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Intr ional Application No
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		NL 1006270 A	17-12-1997